
Evaluation of Group Health Cooperative of Puget Sound's Senior Influenza Immunization Program

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Synopsis

The goal of this study was to identify areas in which an influenza immunization campaign for seniors, sponsored by a health maintenance organization (HMO), could be improved. This study was conducted at Group Health Cooperative of Puget Sound (GHC), serving approximately 470,000 enrollees in Washington State. A survey was administered to two groups of seniors drawn at random—those who received influenza vaccine and those who did not, during the fall and winter of 1991.

Immunization rates were almost 75 percent for "well" seniors and 85 percent for "chronically ill"

seniors. Bivariant analysis showed that two activities of the influenza campaign were associated with vaccine compliance: a provider-generated recruitment letter and exposure to an immunization article in the enrollee newsletter.

Using a broader framework for predicting vaccine compliance, logistic regression showed that vaccine compliance was associated positively with previous immunizations and belief that "my doctor wants me to get a shot," and negatively with fear of adverse reaction and belief that the vaccine is ineffective. There were few suggestions for improving the immunization program, among both vaccinated and unvaccinated enrollees. Approximately two-thirds of unvaccinated enrollees said there was nothing GHC could do to convince them to be vaccinated.

These findings suggest high vaccine compliance and satisfaction with an HMO-sponsored influenza campaign. Strategies and potential to further increase vaccination rates are discussed.

INFLUENZA VIRUS INFECTION is an important communicable disease for seniors, especially those with chronic cardiac and respiratory conditions. Although seniors make up only about 15 percent of the general population, they account for at least 50 percent of hospitalizations (1) and 80 to 90 percent of deaths attributable to influenza (2). Vaccination of high-risk persons (seniors, residents of nursing homes, and adults and children with chronic disorders of the pulmonary or cardiovascular systems) each year before the influenza season is currently the most effective measure for reducing the impact of influenza (3).

Despite the availability of effective, inexpensive influenza vaccines and a variety of promising intervention strategies to increase vaccine compliance (4-8), less than one-fourth of the national population recommended for vaccination by the Centers for Disease Control and Prevention are currently vaccinated (9,10). Reasons for not being immunized include negative attitudes (11,12), previous side

effects (11,13), lack of awareness (12), and missed opportunities (14).

Except for the findings in a recently released study among a Medicare population (8), published rates of influenza immunization for particular subgroups of the population rarely exceed 40-55 percent (15,16). In contrast, Group Health Cooperative of Puget Sound's (GHC's) reported influenza immunization rate for seniors was 71 percent in the 1991-92 influenza season based on information from an automated Immunization Information System (IIS). This immunization rate, while exceeding the national health objective for the year 2000 of 60 percent vaccine coverage (17), (objective 20.11), still does not meet GHC's goal set by its Committee on Prevention to vaccinate 85 percent of seniors (65 years or older) by 1995 (18). GHC's continued emphasis on immunization compliance is, in part, because seniors make up such a large proportion of the total population recommended for influenza vaccination.

The ongoing influenza campaign at GHC provided an opportunity to understand better successful elements of the program. Using as a framework a decision model for predicting influenza compliance (19), the goals of this study were to (a) identify areas of the program that worked well and were associated with vaccine compliance, (b) identify potential areas where the campaign could be improved, and (c) assess general satisfaction with a health maintenance organization's (HMO's) influenza campaign.

Methods

Setting. We conducted this study at Group Health Cooperative of Puget Sound, a not-for-profit, consumer-governed HMO serving approximately 470,000 enrollees in Washington State and operating 29 primary care or family medical centers and 2 hospitals in the Seattle metropolitan area. GHC provides comprehensive health and medical care to its enrollees. Influenza and pneumococcal vaccines are offered as a covered benefit (without a co-pay) to all enrollees.

Since 1985 an organized annual influenza campaign has been coordinated by the HMO's Center for Health Promotion to increase immunization rates among high-risk population groups and to encourage and enhance enrollees' cold and influenza self-care skills. During this period (1985–91), the influenza immunization rate for seniors increased from 41 percent to 71 percent.

Influenza campaign. The influenza campaign has four major components: publicity, education on self-care for colds and flu, recruitment, and special immunization clinics. The publicity component was developed to provide consistent messages to enrollees and providers about the need for and delivery of immunizations. Articles and announcements appear in GHC's internal newsletters, primary care clinic newsletters, and VIEW, a bimonthly magazine sent to all enrollees (contract holders).

Internal newsletters remind and encourage medical staff, nurses, and other health care providers to talk to enrollees about the importance of immunizations. Each fall, VIEW publishes an article on influenza—current facts and recommendations for influenza immunization. Included in all publicity efforts is a telephone number—a central resource line—where responses to enrollees' and providers' questions are available.

To augment the publicity effort an educational, self-help brochure, "Cold, Flu, and You: A Guide to Taking Care of Yourself at Home," is made available

to enrollees and distributed throughout the primary care system. This brochure provides information on colds and influenza and promotes self-care skills with the goal of reducing visits and calls to medical centers.

Before the influenza season begins, usually in October, seniors receive a letter from their primary clinic with information about the upcoming influenza season, informing them that a safe, effective vaccine is available and that medical staff recommend immunization (except for those with contraindications). All physicians practicing at the primary clinic are listed at the bottom of the recruitment letter. The letter identifies dates, times, and locations of the influenza clinics and indicates that no appointment is necessary for an influenza vaccination.

The fourth component of the campaign, influenza clinics, are organized at the primary clinic level and are offered during a 4- to 8-week period in the fall. The availability of clinics is advertised through the recruitment letter (mentioned earlier) which usually includes a schedule for both day and evening immunizations. During this time, some primary care clinics offer immunizations at off-site locations in the community, such as churches and activity centers, to improve access.

Survey methods. In this study, we sampled two groups of seniors drawn at random from GHC enrollment files: (a) those who were identified as receiving an influenza vaccine through the IIS during the fall and winter of 1991 and (b) those who did not receive a vaccine. Because we were particularly interested in participation in the influenza program by chronically ill seniors, vaccinated and unvaccinated enrollees were stratified by the presence of a chronic illness, creating four groups to sample: (a) vaccinated chronically ill seniors, (b) unvaccinated chronically ill seniors, (c) vaccinated well seniors, and (d) unvaccinated well seniors. Unvaccinated seniors were over-sampled to permit better understanding of the determinants of not being vaccinated. To be eligible for the study, a person had to be (a) enrolled at GHC for the entire 1991 calendar year, (b) older than 64 years, and (c) obtain primary care medical care at a GHC clinic located in western Washington State excluding Whatcom and Skagit Counties.

Data were collected by a mailed survey, with telephone followup on a subset of survey questions for nonrespondents. The survey form included questions about previous influenza vaccine behavior, exposure to GHC influenza campaign activities, attitudes and knowledge about effectiveness of influenza vaccine, intentions to be immunized next

year, suggestions for improving the influenza campaign, health status, health care utilization, and sociodemographic information. Questions related to respondents' intentions to receive influenza vaccine or perceived effectiveness of immunization were adapted from the work of Carter (19). This group developed a decision model for predicting influenza compliance with a Veterans Affairs population group.

Definitions. A chronically ill person was identified through the use of the Pharmacy Information System and included only enrollees who had at least one drug associated with chronic illness prescribed during a 3-month period in 1991. The list of 251 drugs included anti-infectives (sulfonamides, isolazamides, anti-TB, antibiotics), anti-inflammatory (glucocorticoids), antineoplastic, cardiac, diabetic, and respiratory drugs.

Analysis. For this analysis, we defined immunization compliance by an affirmative answer to the question, "Did you get a flu shot during the flu season last year—fall/winter of 1991/1992?" Differences in means and proportions of those who received the influenza vaccine and those who did not were compared using *t*-tests and chi-square tests. Logistic regression was used to assess the independent contribution of variables. Because 49 telephone respondents were asked only a limited set of survey questions, they are not included in the multivariate analysis.

Results

The original sample included 390 names; 92 percent were eligible to be surveyed. Three percent of the original sample had died, and 5 percent were deemed not competent by a collateral source (spouse, relative, or attendant) during telephone followup procedures and were not included in the analysis. Completed surveys were returned or telephone responses were obtained from 91 percent of the eligible sample. Three percent refused, 3 percent had disconnected telephone numbers, and 3 percent did not return messages or did not answer the telephone.

The response rate within the four strata ranged from 87–88 percent for unvaccinated enrollees to 95–100 percent for vaccinated enrollees. More than three-fourths of vaccine recipients (chronically ill = 63 of 83, well seniors = 66 of 80) returned completed questionnaires after the first mailing. In contrast, less than one-third of unvaccinated chronically ill seniors (23 of 77) and less than one-half of unvaccinated well seniors (39 of 85) returned the questionnaire

Table 1. Sociodemographic characteristics by influenza immunization status (yes or no), percentages

Characteristic	Chronically ill			Not chronically ill		
	Yes (N=83)	No (N=77)	P value	Yes (N=80)	No (N=85)	P value
Age, (mean years)	76.5	75.7	.52	74.1	73.8	.80
Female	58	58	.94	65	60	.51
White	97	92	.13	97	99	.55
Living alone	24	39	.06	30	31	.49
House or apartment ¹	95	92	.44	95	96	.63
Not married	43	42	.78	35	43	.03
Education ≤12 years	41	50	.37	45	39	.55
Income <\$25,000	63	83	.03	56	52	.67

¹ Compared with nursing home, retirement home, or some other residential setting.

after the first mailing ($P < .001$).

There were few differences in sociodemographic characteristics among vaccinated and unvaccinated enrollees (table 1). Income above \$25,000 (for chronically ill seniors) and being married (for well seniors) were positively associated with vaccination status.

With respect to self-reported health status and health care use, the patterns were different for the two groups (table 2). In the chronically ill group, "heart problems" and diabetes were negatively associated with vaccination. Among well seniors, only number of illnesses and number of primary care visits were associated with vaccination status. Hospital admissions during the past 12 months were not related to immunization status. In both groups, previous vaccination in the last 5 years was strongly associated with current immunization status.

Table 3 highlights exposure to the fall immunization campaign by vaccination status. In both groups, a higher proportion of those who were vaccinated recalled receiving a recruitment letter from their primary care clinic. Among the chronically ill group, their physician talking to them "about the importance of getting an influenza shot" was positively associated with vaccine compliance; in the not chronically ill group, seeing and reading the VIEW article was associated with vaccination compliance.

Unfavorable attitudes about the effectiveness of influenza vaccine was widespread among those not vaccinated (table 4). In both unvaccinated groups, there was a strong sentiment that "the influenza shot doesn't work so there is no point getting it," and that "you can get a bad reaction or get the influenza from an influenza shot." In addition, unvaccinated chronically ill enrollees were much more likely to believe that "the influenza shot does not mix well with other medicines and may make current illness worse." Enrollees' belief that "my doctor at GHC wants me

Table 2. Health status by influenza immunization status (yes or no), percentages

<i>Self-reported health status</i>	<i>Chronically ill</i>			<i>Not chronically ill</i>		
	<i>Yes (N=67)</i>	<i>No (N=46)</i>	<i>P value</i>	<i>Yes (N=71)</i>	<i>No (N=59)</i>	<i>P value</i>
Fair or poor.....	40	39	.92	13	14	.74
Blood pressure.....	32	38	.52	35	20	.06
Heart problem.....	39	59	.04	7	5	.63
Arthritis.....	55	48	.48	43	41	.75
Cancer.....	12	15	.64	6	5	.88
Emphysema.....	28	15	.10	1	8	.06
Diabetes.....	15	30	.05	3	2	.65
Asthma.....	19	16	.60	1	0	.36
Kidney.....	2	2	.77	1	2	.90
Anemia.....	6	2	.35	1	2	.91
Immune disorder.....	2	4	.38	3	0	.19
Mean number of illnesses.....	2.1	2.3	.10	1.0	.85	<.01
Utilization:						
Mean number of primary care visits.....	4.9	5.8	.11	3.3	2.3	.04
Hospital admission per past year.....	35	32	.69	14	12	.66
Mean number of vaccinations last 5 years.....	4.3	.3	<.01	3.8	.14	<.001

Table 3. Exposure to Group Health Cooperative of Puget Sound interventions by influenza immunization status (yes or no), percentages

<i>Influenza campaign interventions</i>	<i>Chronically ill</i>			<i>Not chronically ill</i>		
	<i>Yes (N=83)</i>	<i>No (N=77)</i>	<i>P value</i>	<i>Yes (N=80)</i>	<i>No (N=85)</i>	<i>P value</i>
Talk, physician.....	50	32	.02	29	27	.77
Talk, nurse or other provider.....	35	25	.18	20	19	.87
Recruitment letter.....	69	37	<.001	64	47	.05
Saw VIEW magazine article.....	70	62	.28	77	56	<.01
Read VIEW magazine article.....	89	85	.52	95	75	<.01
Mean number of exposures.....	3.0	2.7	.36	2.8	2.4	.20

to get an influenza shot” was positively related ($P<.001$) to vaccine behavior among both well seniors and chronically ill seniors.

Multivariate analysis showed that previous number of vaccinations was the single most important variable associated with current immunization status (odds ratio = 504.5) among the combined groups. None of the other variables identified in the bivariate analysis, except belief that “My doctor wants me to get a shot” (odds ratio = 22.7), contributed significantly to the regression model when previous number of vaccinations was included. When this variable was removed from the model (table 5), belief that “My doctor wants me to get a shot,” fear of a bad reaction, and heart problems were associated with vaccination status among chronically ill seniors. In the not chronic (well) group, only the belief that “My doctor wants me to get the shot” was associated with immunization compliance.

With regard to future immunization plans, almost 15 percent of unvaccinated enrollees indicated that they intend to get vaccinated next year (not shown).

Among this group and the vaccinated group, the primary reason for being vaccinated was they “just didn’t want to get sick.” Other reasons such as not wanting to be dependent on other people, missing daily activities, or giving the influenza to other people did not surface as important reasons to be vaccinated. Only about half of this group had suggestions about improving the influenza campaign. The majority of these suggestions centered around arranging more flexible times and locations for influenza clinics.

Two-thirds of unvaccinated enrollees indicated the primary reason they were not going to be immunized next year centered around beliefs that the vaccine would not reduce their chances of “catching” influenza and the belief that they would get sick from the influenza shot. Issues concerning access to GHC and personal time constraints did not surface as barriers to immunization.

As a final attempt to assess willingness to become immunized, we asked the remaining 85 percent of enrollees who said they did not intend to get

Table 4. Attitudes by influenza immunization status (yes or no), percentages

Category	Chronically ill			Not chronically ill		
	Yes (N=65)	No (N=40)	P value	Yes (N=71)	No (N=51)	P value
Negative attitudes:						
Bad cold—get over it easily.....	23	38	.10	27	33	.43
Not contagious.....	20	28	.34	22	34	.15
Influenza shot doesn't work.....	3	32	<.001	1	18	<.001
Influenza shot doesn't mix well with other shots.....	16	58	<.001	18	23	.58
Bad reaction.....	40	84	<.001	44	65	.03
Physician's attitude:						
Physician wants me to get a shot.....	95	60	<.001	91	52	<.001

immunized next year if there "is anything GHC could do to convince you to get an influenza shot in the fall before the influenza season starts?" Two-thirds of both high-risk groups said no. The remaining one-third indicated that a physician or nurse spending more time with them discussing the importance of immunization and providing more educational materials might convince them to change their minds next year.

To develop better estimates of the overall immunization rate among the two groups in this study, information from the mailed survey on false negatives and false positives was collected. In the chronically ill group, false negatives (those who reported receiving an influenza vaccine when there was no record of receiving vaccine in the information system) were evenly split between enrollees getting immunized at a GHC facility or sponsored activity, and enrollees getting vaccine outside the GHC system. Two-thirds (8 of 12) of those vaccinated outside GHC were vaccinated locally and one-third (4 of 12) were vaccinated in another State. In the well senior group, about the same percentage of enrollees received an influenza shot outside the GHC system; however, we were unable to determine vaccine locations for six enrollees. There were no false positives in the chronically ill group and only one false positive case among well seniors. Overall, these data suggest that immunization rates are about 5 percent higher than originally estimated from the IIS method for tracking (83.5 percent for chronically ill seniors and 73.1 percent for well seniors).

Estimates of the total number of high-risk enrollees not immunized for influenza are presented in table 6. This group includes, in addition to well seniors and chronically ill seniors, chronically ill adults ages 18–64 and chronically ill children. These latter two groups are also recommended by Immunization Practices Advisory Committee for immunization because of their increased risk for medical complica-

Table 5. Factors independently associated with influenza vaccine compliance¹

Groups	Odds ratio	P estimate	SE ²	P
Chronically ill seniors:				
Physician recommends.....	12.178	2.4996	.9339	.007
Bad reaction.....	.028	–3.56	1.0658	.001
Heart problem.....	.246	–1.4021	.7127	.049
Not chronically ill seniors:				
Physician recommends.....	6.934	1.9364	.5747	.001
Combined groups:				
Physician recommends.....	14.587	2.6801	.5037	.001
Bad reaction.....	.275	–1.2902	.4691	.006
Vaccine ineffective....	.056	–2.8913	.8196	.000

¹ Excluding the variable previous number of immunizations in past 5 years.

² SE = standard error.

tions (2). They are also targeted by the fall influenza campaign using the same recruitment letter procedures that are used for seniors.

Overall, about 29 percent of enrollees (14,336) recommended for immunization were not vaccinated during the 1991–92 influenza campaign (table 6). The overwhelming majority (75 percent) of unvaccinated enrollees are seniors. Examination of immunization rates by age-risk groups shows that those in the highest risk group (chronically ill seniors) had the highest immunization rates (more than 80 percent) while adults (ages 18–64) and children had lower immunization rates (45 percent and 64 percent, respectively).

Discussion

In this study, we examined predictors of vaccine compliance and satisfaction with an HMO-sponsored senior influenza campaign. Results suggest that recruitment letters and articles in the enrollees'

Table 6. Estimated number of high-risk enrollees not immunized for influenza in fall or winter of 1991–92

Risk groups ¹	High-risk enrollees			
	Total	Not immunized		Percent of total not immunized
		Number	Percent	
Seniors:				
Chronically ill	4,593	758	² 16.5	5
Well	37,968	10,213	² 26.9	71
Subtotal	42,561	10,971	...	76
Chronically ill:				
Adults (18–64)	5,605	3,110	55.5	22
Children	741	264	35.6	2
Subtotal	6,346	3,374	...	24
Total	48,907	14,345	29.3	100

¹Recommended for influenza vaccine by the Immunization Practices Advisory Committee. Chronically ill seniors, adults, children were identified through drug prescriptions filled at the HMO pharmacy during a 3-month period.

²Adjusted rate based on information on false positives and false negatives from the survey.

magazine are associated with vaccine compliance. Less directly attributable to a specific activity in the influenza campaign was the relationship between enrollees' belief that their physician or nurse recommends immunization and actual vaccine compliance. This relationship with a caregiver, while consistent with other findings about the importance of provider recommendations (11,13), is more difficult to interpret as it relates to the influenza campaign. We would have expected that if enrollees' beliefs about providers' recommendations were associated with vaccine compliance, then actual discussions with providers would also be associated with compliance. However, for the most part, this was not the case. Physician, nurse, or other provider discussions about the importance of immunization were not associated with vaccine compliance. Perhaps this was due to problems such as inability to recall discussions with providers.

This lack of relationship may also be a consequence of the general nature of primary care visits in HMOs. These visits are often brief and characterized by a full agenda of provider- and patient-initiated discussion topics. The crowded agenda may result in immunization messages not being fully "transmitted" by the provider or "received" by the enrollee. Therefore, it may be that for this population, printed materials, either in the form of recruitment letters or magazine articles, are more effective communication strategies to increase vaccine compliance. These communication strategies allow enrollees to read and review prevention materials and messages in conditions that are less stressful and more conducive to comprehension and retention.

The importance of specific influenza campaign activities was diminished considerably when vaccine compliance was viewed in a broader conceptual context, which included past vaccine compliance behavior, negative attitudes, provider recommendations, and myths about influenza vaccine. In this context it was clear that previous vaccine behavior and provider recommendations were most strongly associated with vaccine compliance.

The negative relationship in the chronically ill group between self-reported "heart problems," or diabetes and vaccine compliance was somewhat surprising. We would have expected that because these groups of enrollees are at higher risk for complications from influenza, that they would be more likely to be vaccinated. However, this was not the case. It may be that, with these enrollees, providers spend more time dealing with medical problems associated with the illnesses and as a consequence immunization is less likely to occur.

In a similar vein, enrollees who reported having heart problems or diabetes are probably, as a group, the "sickest" of those with chronic conditions (see table 2) with the exception of those with emphysema. It may be that this group of enrollees, because of the nature of their illness, may be less able to access immunization services, be more preoccupied with potential adverse reactions, be more concerned with other medications not mixing well with the influenza vaccine, or have other lifestyle practices associated with heart disease and diabetes that discourage primary care visits (for example smoking, drinking).

The fact that one form of printed intervention materials, the recruitment letter, worked for chron-

ically ill enrollees and the other form, VIEW, worked for not chronically ill seniors suggests some potential savings in resources. The more expensive recruitment letters could be sent only to chronically ill enrollees, who make up approximately 10 percent of the total senior population. To bolster immunization compliance among the unvaccinated well seniors, our results suggest that articles in the enrollees' magazine should continue to emphasize the concept that their physician strongly recommends influenza immunization.

Despite the high immunization rates, two-thirds of unvaccinated enrollees said there was little GHC could do to change their minds. This group may represent the "ceiling" where additional intervention efforts or resource expenditures will result in little gain in vaccine compliance behavior. Still, in contrast, the remaining one-third of unvaccinated enrollees indicated that having providers spend more time discussing immunization issues might result in vaccine compliance next year. For this group, based on our results, discussions should focus on (a) myths about reactions to influenza vaccine, (b) efficacy of the vaccine, and (c) a strong recommendation from the provider to be vaccinated.

In addition to specific campaign activities and other variables from the broader decision model that could be linked to vaccine compliance, other key elements can contribute significantly to the success of this program. These elements, which were not directly addressed in this study, include (a) all enrollees regardless of benefit plan receive influenza vaccinations free, (b) enrollees can be vaccinated at any primary clinic or medical care center in a five-county metropolitan area, and (c) no appointment is necessary for vaccination. These "delivery system" elements in a managed care environment assure free and relatively easy access to influenza vaccine.

Results of this study suggest that those most in need of influenza vaccination (chronically ill seniors) have the highest rates of vaccination compliance. Group Health Cooperative of Puget Sound provides care to almost 500,000 enrollees, including 38,000 well seniors and 5,000 chronically ill seniors, and vaccine compliance is highest in the chronically ill senior group—about 84 percent. Targeting interventions and resources appears to be working in this campaign.

Findings from this study also suggest that many of the key principles thought to be necessary for implementing effective preventive services in primary care settings (20) have been addressed in the planning and delivery of influenza immunization services in this managed care delivery system. These principles

'A chronically ill person was identified through the use of the Pharmacy Information System and included only enrollees who had at least one drug associated with chronic illness prescribed during a 3-month period in 1991.'

include identifying baseline performance rates, setting reasonable goals, developing comprehensive plans to achieve goals, using reminder systems to recruit high-risk patients, and minimizing economic barriers for patients. Using this broader preventive services framework, our results suggest that opportunities to further improve vaccination rates may still exist in the areas of (a) improving communication between provider and patient and (b) developing a computerized reminder system that identifies all high-risk patients who do not follow through with immunization.

Several limitations of this study should be mentioned. First, because it is based on a sample of enrollees in an HMO, the results are not generalizable to other population groups. Results from a recently released study on an influenza program for Medicare recipients suggest similar promising findings. Even so, it is unclear how findings from this study would extrapolate to other HMOs or fee-for-service plans.

Second, our definition of chronic illness (receipt of prescription for at least one drug associated with chronic illness during a 3-month period in 1991) was, for convenience sake, arbitrary. Estimates of the number of chronically ill seniors would have doubled if we had increased the pharmacy prescription window to a 12-month period. On the other hand, at the same time the estimate of well seniors would have been reduced by the number of new chronically ill seniors. Results might have been affected if more well seniors were counted as chronically ill seniors in the original sampling plan.

Finally, our new adjusted vaccine compliance rates are based on comparison of self-report information with Immunization Information System. Ideally, the medical record should have been the "gold standard." However, because of limited resources this was not possible. Since the completion of this study selected chart audits reveal that false positives (comparing the automated information system with the medical record) are relatively rare and false

negatives occur with some regularity. Therefore, our vaccine compliance estimates may be somewhat conservative.

Results of this evaluation show many positive findings including high rates of vaccine compliance across both study populations, few barriers to accessing immunization services, and few suggestions for improving the ongoing campaign. Vaccine compliance was associated with specific aspects of the influenza campaign (recruitment letters and magazine articles) as well as the recurring themes of previous vaccine compliance behavior, provider recommendations, fear of adverse effects, and vaccine efficacy issues identified in many studies (11–13). The results also suggest that about one-third of unvaccinated enrollees are amenable to additional educational efforts to increase vaccine compliance. For this group, intervention strategies should emphasize more personalized provider communication in which issues about vaccine efficacy and adverse reactions are addressed.

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